Surface Tension of Non-aqueous Mixtures (Alkane + Alcohol, Alcoxialcohol, Diol or Polyether Binary Systems): Experimental Results and Analysis using the Prigogine-Marechal Theory

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Surface studies in non-aqueous systems seem to be specially restricted to emulsions and microemulsions. Despite that, the comprehension of simpler mixtures [1] could shed some light on these more complex systems. In this work, we show our results of surface tension measurements for non-aqueous binary mixtures of linear, branched and cycled alkanes with alcohol and/or ether compounds formed by molecules with a linear, branched or cyclic structure (linear polyethers, alcoxyalcohols, alcohol, and diols). For some of these systems new experimental results exist [2, 3], and both pure components could have similar surface tensions. Surface tension was measured in a thermostatted glass cell at several temperatures with the Du Nouy ring detachment (RDM) or the maximum bubble pressure methods (MBPM). The latter used a Sensadyne 600 tensiometer of 0.1 mN/m sensitivity. RDM results were corrected, as usual, with the Harkins & Jordan tables from 1930. The surface tension of all the measured mixtures show the normal positive adsorption behavior at the liquid-vapor interface, and, for some systems, we found a minimum. For those systems studied near and above their upper critical solubility temperature, we confirm the horizontal inflection related to critical closeness [1]. We try to explain the behavior of our systems in terms of molecular interactions, difference of surface tension of the pure components and molecular size difference via the simple Pigogine-Marechal model of polymer solutions [4, 5].

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